Reflection and Refraction Lab

Materials

1. Ruler
2. Protractor
3. Plane Mirror (Universal Mirror)
4. Semicircular Prism
5. Laser Level

Reflection

1. On a blank piece of paper, draw two perpendicular lines so that they form a T.
2. Place the plane mirror on the cross piece of the T so that the stem of the T is perpendicular to the mirror and bisects the mirror.
3. Shine the laser at an angle aimed at the intersection of the mirror and the perpendicular line.
4. Trace the laser line and its reflection.
5. Measure the angle between the laser lines and the perpendicular lines.
   $\theta_i =$ _____
   $\theta_r =$ _____
6. Repeat 3-5 for another angle.
   $\theta_i =$ _____
   $\theta_r =$ _____
7. Repeat 3-5 using the curved side of the mirror.
   $\theta_i =$ _____
   $\theta_r =$ _____
8. What do you notice about the incident angle and the reflected angle?

Refraction

1. On a blank piece of paper, draw two perpendicular lines so that they form a T.
2. Place the flat side of the semicircular prism on the cross piece of the T so that the stem of the T is perpendicular to the prism and bisects the prism.
3. Shine the laser at an angle aimed at the intersection of the prism and the perpendicular line.
4. Trace the laser line and its refraction.
5. Measure the angle between the laser lines and the perpendicular lines.
   $\theta_1 =$ _____
   $\theta_2 =$ _____
6. Repeat 3-5 for another angle.
   $\theta_1 =$ _____
   $\theta_2 =$ _____
7. What do you notice about the incident angle and the refracted angle?

8. Try using the angles in $n_1 \sin\theta_1 = n_2 \sin\theta_2$ where θ_1 is the incident angle, $n_2 = 1$, and θ_2 is the refracted angle. Solve for n_1.
   $n_1 =$ _____
   Compare this to 1.49 using percent error.
   $\%\ error = \frac{measured - theoretical}{theoretical}$
   $\%\ error =$ _____